

## CLAIMS

1. A switching system for a telecommunications network, comprising:
  - a) a first stage having input and output sides, said output side concentrated relative to said input side; and
  - b) a second stage having input and output sides, said input side of said second stage coupled to said output side of said first stage and said output side of said second stage being comprised of a plurality of outputs;
  - c) for a plurality of cells arriving, at said second stage, in a first time slot, said second stage placing each cell having a unique destination address on a selected one of said plurality of outputs and aging each cell having a non-unique destination address.
2. The switching system of claim 1 wherein said first stage is a concentrator.
3. The switching system of claim 2 wherein said concentrator performs an N:L concentration on cells arriving in said first time slot.
4. The switching system of claim 1 wherein said second stage is a non-recirculating sort and trap stage.

5. The switching system of claim 1 wherein said second stage further comprises:
  - a) a sorter substage for arranging said plurality of cells arriving at said second stage in said first time slot in a first order, said first order based upon said destination address and a priority for each one of said plurality of cells; and
  - b) a trap substage for placing each cell having said unique destination address on said selected one of said plurality of outputs and aging each cell having said non-unique destination address;
  - c) wherein, in a next time slot, said trap substage placing said aged cells on selected ones of said plurality of outputs if said non-unique destination address for said aged cells becomes unique in said next time slot.
6. The switching system of claim 5 wherein said sorter substage is a Batchier sorter.
7. The switching system of claim 5 wherein said trap substage further comprises:
  - a) a trap buffer in which said cells having non-unique destination addresses for said first time are aged until said next time slot.
8. The switching system of claim 1 wherein said second stage further comprises:
  - a) a sorter substage for arranging said plurality of cells arriving at said second stage in said first time slot in a first order, said first order based upon a destination address and a priority for each one of said plurality of arriving cells; and

- b) a trap substage for placing each one of said arriving cells having a unique destination address on a selected one of said plurality of outputs and aging each one of said arriving cells having a non-unique destination address;
- c) wherein said trap substage places said aged cells on selected ones of said plurality of outputs in selected ones of a series of at least one subsequent time slots, said trap substage selecting said subsequent time slot for a selected aged cell when said destination address for said selected aged cell becomes unique for said selected subsequent time slot.

9. The switching system of claim 8 and further comprising:

- a) a third stage having an input side comprised of a plurality of inputs, each coupled to a corresponding one of said plurality of outputs of said second stage;
- b) wherein, in said first time slot and each one of said series of at least one subsequent time slots, said second stage placing a cell having a unique destination address on a selected one of said plurality of outputs.

10. The switching system of claim 9 wherein said third stage further comprises a queuing stage.

11. The switching system of claim 10 wherein said queuing stage further comprises a plurality of queues, each having an input coupled to a corresponding one of said plurality of outputs of said second stage and an output; each one of said plurality of queues buffering cells having a common destination address to be output said switching system.

12. A high performance broadband ATM switching system, comprising:
  - a) a concentrator stage having a plurality of input ports for said switching system and a plurality of outputs, said concentrator concentrating cells entering said switch on said plurality of input ports onto said plurality of outputs by discarding idle ones of said plurality of inputs;
  - b) a non-recirculating Batcher sorter trap stage having a plurality of inputs and a plurality of outputs, each of said plurality of inputs of said non-recirculating Batcher sorter trap stage coupled to a corresponding one of said plurality of outputs of said concentrator stage;
  - c) a plurality of queues, each one of said queues having an input coupled to a corresponding one of said plurality of outputs of said non-recirculating Batcher sorter trap stage and an output port for said switching system, each one of said plurality of queues buffering cells exiting said switching system which share a common destination address;
  - d) said non-recirculating Batcher sorter trap stage placing, during a selected one of a plurality of time slots, selected ones of a plurality of cells arriving thereat during a first one of said plurality of time slots onto a selected one of said outputs thereof if said selected ones of said plurality of cells have a unique destination address for said selected time slot.
13. The switching system of claim 12 wherein said non-recirculating Batcher sorter trap stage further comprises:

- a) a sorter substage for ordering said plurality of cells arriving at said second stage in each one of said plurality of time slots based upon said destination address and a priority for each one of said plurality of arriving cells; and
- b) a trap substage for placing, during each one of said plurality of time slots, each one of said plurality of cells having either a unique destination address or the highest priority among cells sharing a non-unique destination address on a selected one of said plurality of outputs;

for each one of said plurality of time slots, said trap substage selecting cells for placement on said plurality of outputs from a set of cells comprised of cells arriving from said sorter substage during that one of said plurality of time slots and cells aged from the time slot immediately preceding that one of said plurality of time slots.

14. The switching system of claim 13 wherein said concentrator stage performs N:L concentrations on arriving cells.

15. The switching system of claim 13 wherein said sorter substage is a Batchier sorter.

16. The switching system of claim 13 wherein said trap substage further comprises a trap buffer for aging said cells.

17. A multi-cast switching system, comprising:
- a) a broadcast network having input and output sides, said broadcast network receiving, on said input side, a plurality of source cells from at least one source and a plurality of empty copy cells, said broadcast network copying data from selected ones of said plurality of source cells to selected ones of said empty copy cells to produce copies of said source cells;
  - b) a non-recirculating Batcher sort-trap stage having input and output sides, said input side of said non-recirculating Batcher sort-trap stage second stage coupled to said output side of said broadcast network and said output side of said second stage being comprised of a plurality of outputs;
  - c) for a plurality of cells arriving, at said second stage, in a first time slot, said second stage placing each cell having a unique destination address on a selected one of said plurality of outputs and aging cells having a non-unique destination address;
  - d) wherein said plurality of cells includes said source cells and said copies of said source cells.

18. The multi-cast switching system of claim 17 wherein said broadcast network further comprises:

- a) a source sort stage for sorting source and copy packets entering said source sort stage based upon a data source identifier for each one of said plurality of source packets and said plurality of copy packets; and

- b) a copy stage for copying data from source packets containing a first data source identifier to copy packets containing said first data source identifier.

19. The multi-cast switching system of claim 18 wherein said non-recirculating Batchter sort-trap stage further comprises:

- a) a sorter substage for arranging said plurality of cells arriving at said second stage in said first time slot in a first order, said first order based upon said destination address and a priority for each one of said plurality of cells; and
- b) a trap substage for placing each cell having said unique destination address on said selected one of said plurality of outputs and aging each cell having said non-unique destination address;
- c) wherein, in a next time slot, said trap substage placing said aged cells on selected ones of said plurality of outputs if said non-unique destination address for said aged cells becomes unique in said next time slot.

20. The multi-cast switching system of claim 19 wherein said sorter substage is a Batchter sorter.

21. The multi-cast switching system of claim 19 wherein said trap substage further comprises a trap buffer in which said cells having non-unique destination addresses for said first time are aged until said next time slot.

22. The multi-cast switching system of claim 1 wherein said non-recirculating Batchter sort-trap stage further comprises:

- a) a Batchter sorter substage for arranging said plurality of cells arriving at said second stage in said first time slot in a first order, said first order based upon a destination address and a priority for each one of said plurality of arriving cells; and
- b) a trap substage for placing each one of said arriving cells having a unique destination address on a selected one of said plurality of outputs and aging each one of said arriving cells having a non-unique destination address;
- c) wherein said trap substage places said aged cells on selected ones of said plurality of outputs in selected ones of a series of at least one subsequent time slots, said trap substage selecting said subsequent time slot for a selected aged cell when said destination address for said selected aged cell becomes unique for said selected subsequent time slot.

23. The multi-cast switching system of claim 8 and further comprising:

- a) a third stage having an input side comprised of a plurality of inputs, each coupled to a corresponding one of said plurality of outputs of said second stage;
- b) wherein, in said first time slot and each one of said series of at least one subsequent time slots, said second stage placing a cell having a unique destination address on a selected one of said plurality of outputs.



24. The multi-cast switching system of claim 9 wherein said third stage further comprises a queuing stage.

25. The multi-cast switching system of claim 10 wherein said queuing stage further comprises a plurality of queues, each having an input coupled to a corresponding one of said plurality of outputs of said second stage and an output; each one of said plurality of queues buffering cells having a common destination address to be output said switching system.